A

TREATISE

UPON

Wheel-Carriages;

Shewing their preſent DEFECTS:

WITH

A PLAN and DESCRIPTION

OF

A New Conſtructed Waggon:

WHICH

Will effectually preſerve and improve the Public Roads, and be more uſeful, cheap, and handy to the Proprietor.

BY

DANIEL BOURN.

LONDON:

Printed for S. CROWDER, in Pater-noſter-row, 1763.

[Price 1s. 6d.]

BRITISH MUSEUM

TO THE HONOURABLE THE

SOCIETY

FOR

Encouraging Arts, Manufactures, and Commerce.

GENTLEMEN,

HOW much ſoever the few following lines may ſtand in need of your indulgence and candour; the neceſſity of illuſtrating the alteration therein recommended, and the ſincerity of the intention, will, I hope make ſome atonement for committing them to the preſs.

I HAVE made uſe of the ſame unreſerved ſimplicity and freedom, as if I had

been ſtating the arguments and enforcing the ſentiments to the moſt intimate neighbour. If any thing herein ſhall be found in the leaſt degree beneficial to the public, the pains I have taken will be very well beſtowed, and the pleaſure reſulting therefrom an ample compenſation.

As the ſole intention of your inſtitution is to ſpirit up and promote every valuable atchievement, therefore (if this may be allowed to be ſo termed) I have a model awaits your inſpection; your readineſs to examine the ſtructure and properties of which, need not, I apprehend keep me in any ſuſpence: and if it ſhould be found ſufficient to merit your approbation, you will perhaps, gentlemen, think of ſome expedient by which to promote and encourage its general uſe. And whereas its prime intention is to benefit the roads, therefore an act, could it be obtained, to exempt it from expence at the turnpike gates (at leaſt for a certain time) may poſſibly be judged as reaſonable as it will doubtleſs be neceſſary.

THAT all ſorts of roadway carriages ſhould be ſubject to the reſtrictions of the law, is highly requiſite, in regard there is both a perſonal and public intereſt engaged in their uſage: And that they are not below the obſervance of the greateſt will be as readily allowed, ſince the more common any inſtrument is, and the greater number are employed, the conſequence thereby becomes the more ſerious and intereſting.

ASCERTAINING the longitude, making navigable canals, building bridges, draining marſhy lands, &c. are great works, which juſtly attract the attention of mankind: yet perhaps a ſingle hint in the common occupations of life, may by its multiplicity produce as important an iſſue.

THESE, Gentlemen, are the conſiderations, that induce me to lay before you the following tract: which however deficient of the form and dreſs it might have aſſumed from an abler hand, contains at leaſt a well intended deſign, and will, I hope,

meet with your acceptance, from him who is, with the utmoſt veneration and reſpect,

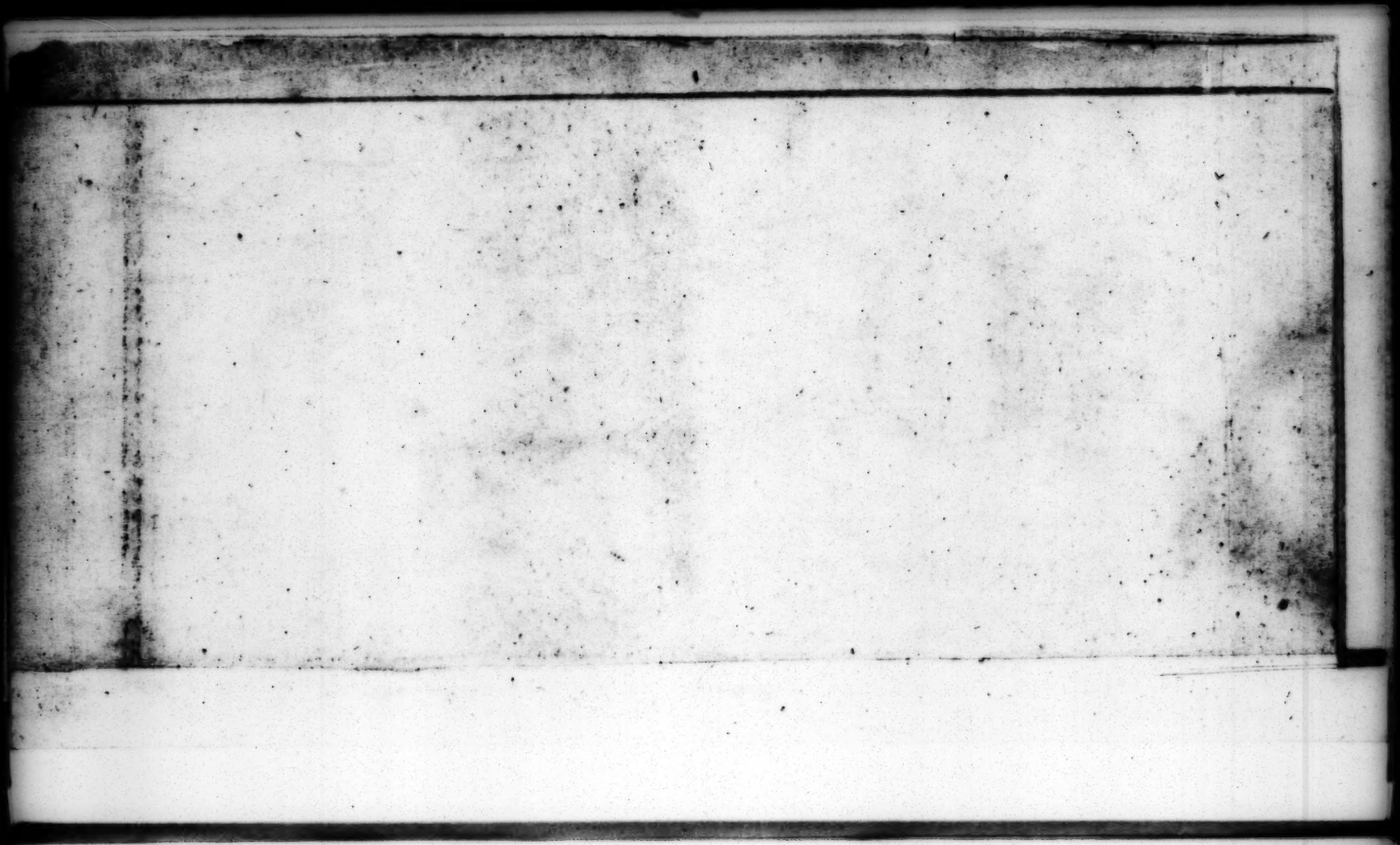
GENTLEMEN,

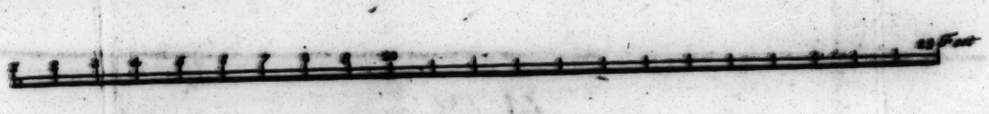
Your dutiful,

And obedient Servant,

Leominſter,
Dec. 1, 1763.

DANIEL BOURN.





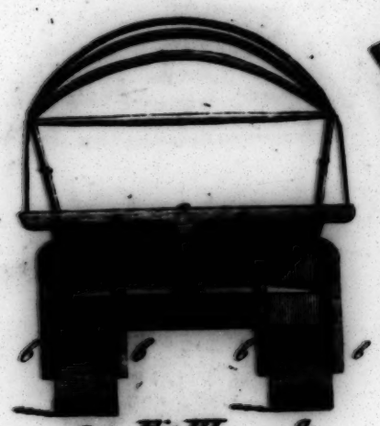


Fig. III.

Fig. IIII.

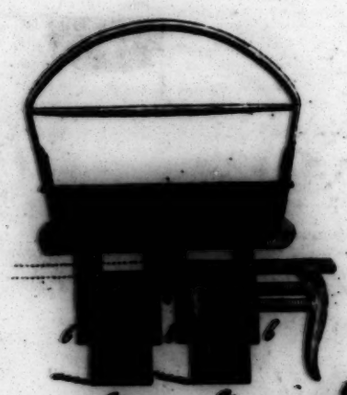


Fig. II.

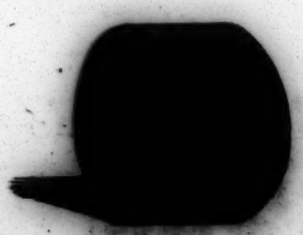
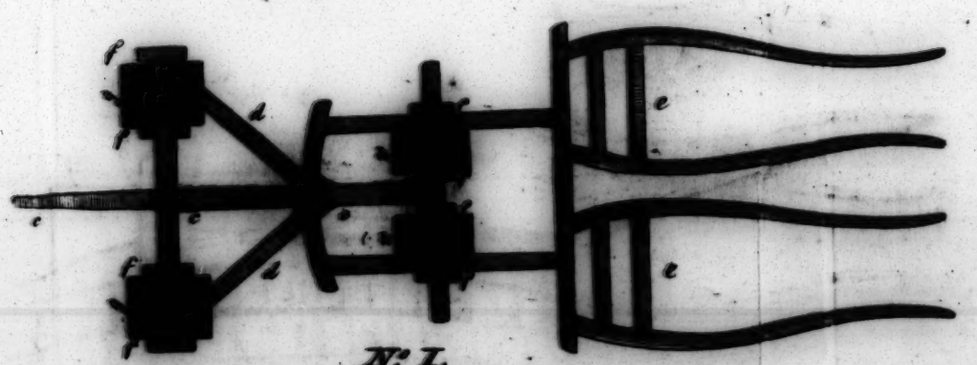


Fig. V.



N°. I.

Fig. VI.

E. Edwards delin.

M.r Byrne sculp.

EXPLANATION of the PLATE.

FIG. I. A plan of the fore and hinder carriage of a waggon.

a a The two fore wheels.

b b The hinder ones.

c c c The tail-pole.

d d The laces.

e e The ſhafts.

f f f f f f f f The upright planks.

g g The beams.

FIG. II. III. IV. Three elevations, containing a fore, hinder, and ſide view of a waggon.

a a The wheels.

b b The planks.

c c The croſs beams.

FIG. V. A wheel upon a larger ſcale, in perſpective.

a The caſt-metal rim.

b The block of wood that fills the cavity.

c The pivot.

FIG. VI. The ſection of a road.

a a The foot walks.

b b The channels

c The carriage tract.

A

TREATISE

UPON

Wheel-Carriages.

A TIME of peace and tranquility, affords an happy opportunity of improving thoſe arts, ſciences, and inventions, which are the baſis of trade and commerce, and conſequently of wealth and plenty in a country.

AND ſurely nothing merits the regard of a nation more; not any thing redounds more to its honour; or gives it ſuch grace and beauty; ſo facilitates its commerce; or affords ſuch eaſe and pleaſure to its inhabitants as good roads.

AND of all inventions whatſoever, of all the machinery made uſe of, is there any one that can lay claim to much more im-

portance? whoſe influence is wider ſpread, or productive of ſuch intereſting conſequences, as the waggon?

YET, notwithſtanding the truth of theſe aſſertions, how hath both the one and the other lain uncultivated and neglected! how long hath the waggon, by wearing a deſtructive narrow wheeled form, overcome and rendered ineffectual all the worthy tho' faint endeavours hitherto adminiſtered, to amend and make good the highways? And altho' the introduction of the broad nine inch wheel, has of late bid fair for remedying the defects of the former; yet it is incumbered with ſome diſadvantages, which greatly prevent its being of that public and univerſal uſe we could wiſh. And whoever can make any improvement, ſo as to preſerve the roads from being torn or materially hurt, and at the ſame time ſecure its utility, and handineſs to the proprietor, will doubtleſs deſerve the moſt laviſh commendations and thanks of the public.

To effect this ſalutary purpoſe, I ſhall here (to the beſt of my ability) offer my

assistance; and the many mechanical works, I have been engaged in, being also owner of a broad and narrow wheeled team, and having made what remarks, and obtained what helps I am able, and consulted some of the most approved hands in the craft; will, I trust, be some presumption in my favour, and enable me to write upon, and recommend this affair to the public.

THE reason so little hath appeared from the press, upon this subject, may be owing to the few engaged in this way of life that have an improved capacity; and people of parts and education applying their studies otherways, cannot be expected sufficiently conversant with what requires intimacy and experience, joined with speculation and theory.

BEFORE we begin upon our principal design, let us take a view of the general properties of wheels as now in use, with all the brevity possible, leaving incidents to be supplied by the reader's own judgment and experience.

THAT a narrow wheel damages a road more than a broad one needs no proof; and practice has now in a great meaſure removed the prejudices, and convinced the judgment of the moſt refractory.

THE attrition and grinding of narrow wheels, is more than that of broad; and ſooner frets and reduces the hardeſt materials to powder: the broad rolls or tumbles over the materials, and leaves behind a more conſolidated and even tract.

THE narrow feels every crevice, ſinks into the minuteſt hollow, which is the cauſe of that jolting, tottering motion, which not only further damages the Road but the carriage too; and alſo very much retards and deadens its progreſſive direction.

BUT when wheels are very broad, they move along with a more firm and ſteady pace; pleaſant to the cattle, eaſy to the carriage, beneficient to the roads, and ſpeedier in their progreſs.

LET

LET us now enquire into the complaints alledged againſt, and the imperfections attending the broad wheels "as at preſent "conſtructed;" whether expedient for common uſe, and adapted to every farmer's yard? whether they are not too unwieldy and troubleſome? And do they not turn with difficulty? do they not require too many horſes, more than the owner can well ſpare or maintain? and is not the neceſſary expence of erecting one greater than he can well afford? and has he always loading anſwerable to the weight and mightineſs of the machine?

LET us alſo examine into and conſider the Structure of theſe kind of nine inch wheels. The wheels of all ſorts of carriages are ſo placed, as not to ſtand upright, but incline from a perpendicular or vertical poſture very conſiderably, from at leaſt ſix to twelve inches; the deſign of this is to leave room for the bed of the carriage, and to preſerve it from any injury by the wheels; they are alſo convex on the one, and concave on the other ſide; which is intended to ſtrengthen and give firmneſs

neſs * to the wheel, it preſerves the ſpokes from beating up, and guards againſt thoſe violent ſhocks with which it is agitated when in motion; but their inclined poſture neceſſarily obliges them to be made bevil in the periphery, ſo that a broad wheel is a conical figure, or repreſents the fruſtrum of a cone; and naturally, was it diſengaged, when in motion would run in a circle. It ſuffers therefore ſome conſtraint by forcing onward in a ſtraight line, a fret or ſliding is occaſioned on the face of the ground, the axletree is in ſome meaſure racked, and it requires an increaſe of draught to what it would do were the wheels cylindrical.

BUT what is ſtill a much more momentous diſadvantage in nine inch wheels, is the unevenneſs of their periphery, which are in general made very round, or high in the middle, and three ſtreaks abreaſt put on with high headed nails, which muſt in a great meaſure deſtroy the intended benefit of its width, and leave the roads

* To exemplify this, take a piece of tin, which when plain is weak and will eaſily bend, but mould it into a convex form, and it immediately becomes very ſtrong.

in

in that rugged condition we would ſeek to redreſs.

In anſwer to the expence and cumberſomeneſs of the broad wheeled waggon, ſome people will reply, that a cart with theſe ſort of wheels (for thoſe whoſe abilities are circumſcribed in narrow bounds) will anſwer, or at leaſt nearly anſwer all the purpoſes of a narrow wheeled waggon. It is true a broad-wheeled cart, will, in a great meaſure, ſupply the place of a narrow wheeled waggon: yet the hanging the whole weight upon one axletree, which is upon that account much more liable to accidents; the additional fatigue it gives the thiller horſe, which is rendered thereby near uſeleſs, with reſpect to drawing the load; the almoſt neceſſity of having a thiller horſe always in the ſhafts, while loading and unloading; the difficulty of ballancing the load, and the many ſorts of goods that cannot be well put in a cart, ſuch as timber, large ſtone ſlabs, &c. are material objections, when ſet in competition to a waggon.

BUT notwithſtanding all the objections that may be laid to the charge of nine inch wheels, *(to wit)* their expence, their weight and cumberſomeneſs, and the rugged bevil form of their periphery; yet their breadth gives them a great advantage, both with reſpect to their action, and influence upon the path; and when taken in every light, are, upon the whole, vaſtly ſuperior, and ought to be preferred to narrow ones: and had they been encouraged according to their real worth and excellence, would very probably ere now have become the common and prevailing carriage of the country, and the narrow have vaniſhed before them; nor would the farmer or carrier have had any reaſon to complain, ſeeing they can draw on broad wheels a bigger load with fewer horſes, than they could with the other, eſpecially before the introduction of turnpike roads.

YET are we to imagine that here we muſt make a ſtand? that no further progreſs can take place? are we arrived to the laſt ſtage of improvement? The ſequel will, I flatter myſelf, make it appear to be otherwiſe,

wiſe, that many of the foregoing objections may be removed, and a more uſeful, compleat, and leſs exceptionable model be produced.

In the mean time let us obſerve, that ſo late as thirty or forty years ago the roads of England were in a moſt deplorable condition; thoſe that were narrow were narrow indeed, often to that degree, that the ſtocks of the wheels bore hard againſt the banks on each ſide, and in many places they were worn below the level of the neighbouring ſurface many feet, nay yards perpendicular, and a wide ſpreading bruſhy hedge, intermixed with old half-decayed trees and ſtubbs, hanging over the traveller's head, intercepting the benign influence of the heavens from his path, and the beauties of the circumjacent country from his view; made it look more like the retreat of wild beaſts and reptiles, than the footſteps of men.

In other parts, where the road was wide, it might be and often was too much ſo, and exhibited a ſcene of a different aſpect. Here the wheel-carriage had worn a diver-

ſity of tracts, which were either deep, or or rough and ſtony, or high or low, as mother nature had placed the materials upon the face of the ground: the ſpaces between theſe were frequently furzy hillocks or thorny brakes, through or among which the equeſtrian traveller picked out his entangled and uncouth ſteps. To theſe horrible, hilly, ſtony, deep, miry, uncomfortable, dreary roads, the narrow wheel'd waggon ſeems to be beſt adapted, and theſe were frequently drawn by ſeven, eight, or even ten horſes, that with great difficulty and hazard, dragged after them twenty-five or thirty hundred, ſeldom more: Since this time the ſpirit that has appeared in the nation, and the encouragement given to ſetting up turnpikes, and the making of good roads, (though then oppoſed by the undiſcerning populace, that did not know their own intereſt) has greatly altered the face of things, and has opened the way, and made preparation for the exhibition and exerciſe of that much more noble and valuable machine "the broad wheeled "waggon *."

THERE-

* The firſt ſet of broad wheels made uſe of in roads in this kingdom, were erected by Mr. James Morris, of

THEREFORE let us congratulate ourſelves on making thus far ſo happy a progreſs; and as the publick roads continue to mend and improve, as they poliſh and ſmooth, and arrive nearer perfection, ſo let us try if the carriage that travels on this road may not continue to improve too, and receive a ſimilar degree of perfection.

Now in order to this, I would firſt premiſe, that "a low wheel is equally uſeful, "if not preferable to a high one upon a "ſmooth road, and eſpecially if the pivot "upon which it acts is in proportion leſs." I ſay upon a ſmooth road, for this propoſition does not hold equally true in ſtony or

of Brock-Forge, near Wiggan in Lancaſhire; who having a deep bad road to paſs with his team, adviſed with me upon the ſubject; I mentioned the making of the fellies of his wheels of an uncommon width: He accordingly made his firſt ſet thirteen inches, and the next year another of nine inches in the ſole; and his travelling with theſe to Liverpool, Warrington and other places, was took notice of by ſome perſons of diſtinction, particularly Lord Strange, and Mr. Hardman, Member for Liverpool, &c. who after making ſtrict enquiries of Mr. Morris, concerning their nature and properties, reported their utility to the Houſe, which occaſioned an act of parliament being made in their favour.

deep roads; but as theſe are places I deſire to have no concern with, I therefore muſt be underſtood to be upon firm land, and a good well made turnpike road.

YET the advantage of high wheels, even in ſtony and rough roads, is perhaps not ſo great as many imagine. In riſing over an obſtacle *, the elevation of the line the load acts in while advancing, is not in proportion to the ſize of the wheel; and the weight of the wheel when broad, is an overbalance to ſuch advantage of its height, and is felt moſt when aſcending, where help is moſt wanting. And this is ſtill more materially true in the wheels I am going to deſcribe and recommend; yet our broad wheels as made in common are too high, and would go better and laſt longer, were they made lower, and more

* There is a very material difference betwixt ſuch obſtructions, that the wheel rolls up the inclined ſide of, and thoſe that ſtand ſo direct that the wheel firſt touches the higheſt part of. In the firſt of theſe, which are by far the moſt frequent, (and is the ſame as the acclivity of a hill) the low wheel has the advantage; of the latter there are few in the turnpike roads worthy of mention; beſides this argument (if it be any) ſubſiſts only at their firſt introduction, as the frequent uſe of theſe wheels will correct and remove the very objection laid againſt them.

eſpecially

eſpecially ſo if uſed with iron arms, or axletrees, of which I think, whoever has in the leaſt taſted the benefit by experience, will never after uſe any other. But to proceed in the next place,

"THE broader alſo and the more ſpace "a wheel occupieth upon the face of the "ground, the ſmoother, eaſier and better "it moves."

THE motion of a waggon (and more eſpecially the narrow one) is a very irregular wabbling one, perpetually ſinking and riſing; it is this, (together with the friction upon the centers, which is trivial) that occaſions ſo ſtrong a reſiſtance to the cattle: therefore the wider the wheels, the leſs is this fluctuous irregularity, and the eaſier the draught. Thus wide, or broad wheels make a plain even road, and an even road makes the carriage eaſy to draw.

Now that we may obtain theſe two material, theſe only important purpoſes, *(to wit)* making the carriage move forward with a ſteady, even eaſy pace, as upon a true plane; and at the ſame time inſtead

of hurting, benefitting the roads, by levelling and conſolidating them, I would recommend having the wheels made in the following manner:

LET there be run out of caſt iron at the founders hollow rims or cylinders, about two feet high, ſixteen inches broad or wide, and from one to near two inches in thickneſs, according to the deſign or neceſſity of the proprietor, and the burden he intends them to bear. Let the ſpace, or cavity within theſe cylinders be filled up ſolid with a block of wood, through the center of which inſert your arbor or gudgeon, and leave it two inches and ſix eighths at each end longer than the cylinder; which parts muſt be round, and about two inches thick, being the pivots, and when the whole is well wedged, the wheel is compleat.

In order to fix theſe to the carriage, at each end of the wheels or rollers muſt be an upright piece or plank, two inches and an half thick, one foot wide, and about two feet two inches high or long; the lower end of theſe planks ſtand upon the pivots;

pivots; through the upper end paſſes the croſs-beams to which they are faſtened by iron ſcrew-pins *. The lower beam may be about ſeven inches broad, four inches thick, and ſix foot eleven inches long; upon this ſtands the tail-pole and wings or laces, over theſe the upper croſs-beam, which muſt be three inches deep, the ſame thickneſs and length as the lower one, theſe are pinned together by iron ſcrews, as in common waggons. This is a deſcription of the hinder part of the carriage; the ſame ratio muſt be obſerved in the fore part; but a more circumſtantial account will be needleſs, and in order to aſſiſt the reader's imagination, I refer him to the plate annexed to this piece.

HERE then is a ſolid wheel, which anſwers all the intentions of the garden roller; now can any thing be conceived, that would have ſo happy a tendency upon the roads? to render them ſmooth and even, to harden and encruſt the ſurface, and make it reſemble a terraſs walk? I ſay,

* The beams, or croſs-beams (as I term them) on which the carriage ſtands, and which anſwers to, and is conſtituted in the place of the preſent axletree.

can

can any thing be equal to theſe kind of caſt metal rollers, to produce the foregoing effects; nor will theſe wheels be ſubject to any caſualties, without ſpokes, without fellies, without ſtrakes or nails, or nave or bouks; an ever-during wheel made of ſteel (for caſt metal is a kind of ſteel) as hard and durable, that cannot be hurt by violence, or beaffected by weather, neither ſun or wind, can crack or warp it, nor will it ſtand in need of a wain-houſe to preſerve it.

Now although theſe wheels occupy ſo wide a ſpace upon the ground, yet I would by no means adviſe, that in carriages of more wheels than two, the fore wheels ſhould go in the ſame tract with the hinder ones: but let them be ſo placed, that their outſides extend no wider than the inſide of the hinder wheels *. Preſuming therefore

* I am not inſenſible that the late act of parliament limits the diſtance of wheels from the outſide of the one to the outſide of the other to ſix feet three inches; I wiſh a greater liberty had been allow'd; I have ventured to add three inches more, they will thereby ſtand firmer on their baſe, and I have often wondered, that in chaiſes, coaches, and eſpecially phaetons, which are high built and ſubject to overturn, the wheels are not ſet out at a greater diſtance from each other, which would

therefore that the diſtance of the hinder wheels from outſide to outſide are ſix feet ſix inches, there will not be above twelve or fourteen inches ſpace, but what will be paſſed over by a fore or hinder wheel, as followeth.

	Feet.	In.
Breadth of the two hinder wheels	2	8
Ditto of the two fore wheels	2	8
Space between the two fore wheels	1	2
The diſtance of the hinder wheels from outſide to outſide,	6	6

THUS do theſe wheels preſs upon almoſt all that ſpace that is contained under the whole breadth of the carriage; and in regard, under their influence, there can be no tract ſunk below the level of the road, which will appear like a ſmooth hard floor, or ſheet of gravel from ſide to ſide; ſo with confidence we may affirm they will move forward with more ſweetneſs and eaſe than any other ſort: for certainly the

would be their moſt effectual ſecurity from falling: no arguments can be given to the contrary, but what ariſes from the narrowneſs of yards and coach-houſes, which are adapted to carriages built in the days of yore.

narrow wheel that plows and tears up the materials, and breaks through the cruſt or face of the road, wearing deep channels therein; nor even the nine inch wheel, with its bevil uneven periphery, beſtuck with a multitude of rough headed nails, are to be compared to the ſmooth face of the cylinders here mentioned and propoſed, that act as garden-rollers to compreſs and glaze the carpet on which they move, rendering more ſolid and durable the undiſturbed, unoffended materials of the ſurface. And if, notwithſtanding the uncouthneſs of its preſent form, the nine inch wheels are ſo much preferable to the narrow; how much more uſeful and excellent will the wheels be here deſcribed.

I SHALL not make, and then anſwer any ſuppoſititious objections that might be apprehended to what I have advanced; but only add, that they will have all the advantages without the diſadvantages of any other kind. They will turn in much leſs compaſs,—they will bear any load, and not liable to obſtruct or injure the bed, which may be made of any width the owner ſhall deſire.—To draw them will not

not require ſo much ſtrength, — they will be doubly, nay trebly durable, and be obtained at a very low price by the proprietor. — The trouble and expence of taking them off to greaſe and clout will be avoided ;—their weight * will be a degree between the broad and narrow wheels.— Nor may it be unworthy of notice, or diſpleaſing to the land-owner, to find that his tenant will hereby deſtroy leſs of his timber. But what is principally to be conſidered, and their choice leading property, is their beneficial effects upon the highways, which will be moſt apparently ſenſible wherever they paſs. And altho' many narrow and obſcure roads are doubtleſs not yet in a prepared ſtate to admit

* The weight of a narrow wheel'd waggon is from fifteen to twenty hundred ; that of a broad wheel from thirty to forty hundred. The waggon I have propoſed will, I apprehend, weigh ſomewhere between ſixteen and twenty-four hundred ; the expence of a narrow wheeled waggon is between fifteen and twenty pounds, that of a broad wheel between thirty and forty, and if made with iron arms will coſt the owner near fifty pounds. Such a waggon I have deſcribed will coſt from twelve to fifteen pounds ; and although the height and thickneſs of the rims of the wheels depend upon the owner's pleaſure, yet I hope the breadth and ſituation will be invariably adhered to. The locking of them, in order to deſcend a hill, is ſo eaſy to be perform'd either by a bolt or ſhoe, as makes it needleſs to ſay any thing upon this article.

them, therefore thoſe who are ſo unhappy as to be neceſſitated to travel with teams thereon, muſt certainly be contented to jog on as their anceſtors have done before them; but in roads that are only wide enough to receive them, tho' not laid ſo ſmooth, and even as one could wiſh, it is my opinion they will travel greatly better than many people may be inclined to imagine, nay even the ſmall bye-roads, with a very little trouble and expence, might be made fit for their reception.

Let me be permitted to add a clauſe or two, with reſpect to toll-gates.

And I would beg leave to give it as my opinion, that it would be better not to limit carriages of any ſort to a certain number of horſes, but to allow them to draw what number they pleaſe, provided they pay a fixed price for each horſe in the team, and were only fined when detected taking off a horſe or horſes before they came to the gate, with an intent to defraud, not there tendering according to the number they drew on any other part of the road. I acknowledge a narrow wheel

wheel with double the load, will do more than a twofold damage; yet allowing this, can any other method be thought of that will be more adviſeable? that of weighing carriages is what I ſtill much leſs approve; the trouble and expence of ſuch engines through the kingdom would be quite intolerable, and liable to many deceptions. Now there are many advantages will accrue from admitting any number of horſes to paſs the gates; and ſtating the caſe that the owner by this indulgence puts in twice the load, which will ſeldom be done, (for narrow wheels will not long laſt under ſuch oppreſſion) yet the weight upon the road is not double, ſince the machine is the ſame; and if he is required to pay proportionably more at the gate, to the number of his cattle, and the damage done by the wheels, ſurely the public cannot be great ſufferers on this account. Pity it is, that half the ſtrength ſhould be ſwallowed up and loſt with merely drawing the vehicle, while the other half only are employed for the burden. Beſides, he may often very much want to take a greater weight than four horſes can maſter, and he would be very glad to pay the gate for a horſe or

two

two extraordinary, could he be permitted to put them into his team.

HERE a queſtion will very naturally ariſe, to adjuſt how much ſhould be paid; what ſhare is proper for each kind of carriage to depoſite at the toll-gate that it is ſuffered to paſs through? Now can any thing be more reaſonable, and will it not be of the greateſt utility and encouragement, that they ſhould be obliged to pay, in proportion to their beneficial or detrimental effects. Let us therefore ſuppoſe a broad wheel limited to pay two pence each horſe; the ſix inch wheel, whereof ſome are very fond, and which indeed far ſurpaſſeth the narrow, and is a ſtep towards the more perfect kind of machines, we will imagine to pay four pence per head. —With reſpect to narrow wheels, it would be very happy if that deſtructive road-ruining form were entirely extirpated: And were they to pay according to the proportion of damage they do, two ſhillings per head would not excuſe them: but in regard ſo many are ſtill employed in the nation, and more eſpecially as many roads yet remain in a ſtate that will ſcarce admit

of

of any other ſort of carriages, I cannot but think that eight-pence an horſe, nay perhaps ſix-pence, may be quite ſufficient not only to reduce their number, but entirely to aboliſh them.

At many gates above an hundred miles from London, the commiſſioners have impoſed as much per head upon horſes in the broad as the narrow wheeled team, either through prejudice to broad wheels, or falſely judging they thereby acted impartially. But certainly, as I have before ſaid, carriages ought to be encouraged according to their true worth. Beſides, the proprietors of broad wheels have hitherto laboured under the diſadvantage of their novelty.—The ſufferance of narrow wheels upon the ſame road—the want of a proper quarter or tract, owing to the roads not being practiſed by them — and the wheelwright's inability, many of them not having to this day ſkill ſufficient to finiſh them in a maſterly workmanlike manner; and nothing but their intrinſic ſuperiority over the narrow, could have made them break their way ſo far as they have, againſt the barriers of cuſtom and prejudice.

We will conclude with imagining two carriages, the one a narrow wheel, the other ſuch a one as I have been recommending, travelling near together, each upon that kind of road, which would be the conſequential reſult of their alternate paſſing and repaſſing thereupon. We will juſt take a view, both with reſpect to the carriage—the team—and the path they act upon. To begin with the narrow wheeled carriage, which we may juſtly compare to a ſhip in a ſtorm; the perpetual tremor and ruggedneſs of its motion; its beats and concuſſions from ſide to ſide, muſt in ſome degree diſturb and hurt the goods it contains; however, it is certain to looſen the ſpokes in the fellies and ſtocks, ſhake and rack the whole ſtructure, frequently to break the bouks and axletree, and haſtens (before the timber is half decayed) with precipitated ſteps the deſtruction of the fabric. — The cattle alſo, by reaſon of the inequalities of the tract, draw not by an equable conſtant preſſure, but by ſucceſſive intermitting pulſes, or ſtretches, which increaſes (I might ſay doubles) their work — ſpoils their ſtep — bruiſes their

ſhoulders—hurts and fatigues the thiller—and very much checks and impedes their ſpeed.———With reſpect to its influence upon the path, I ſhall only obſerve, that it naturally makes the greateſt effort, and does the moſt damage, in places already the worſt, as the principal ſurge and force of a waggon is againſt the bed of a hollow or cavity; and whereas a narrow wheel ſtands on fewer points or parts of matter than a broad, and is apter to cruſh and pulverize whatever it paſſes over, ſo it neceſſarily is affected by more ſinks or crevices *, and therefore has an equal number

* Even the fineſt walk has many little inequalities, which though ſcarce diſcernible, affect the motion of a wheel; and were there none at all, a narrow one would ſoon produce them. Now a very broad one, by depreſſing every protuberance, will have the ſame effect upon the face of the path as a rolling-mill has upon a piece of ſheet lead or tin. No one will argue that a horſe's foot (by all wiſe Providence, ſpread out to the moſt convenient dimenſion) can ever much diſplace or hurt ſuch face; or if they ſhould, the return and reaction of theſe wheels will immediately heal and reſtore it. A narrow wheeled cart has a yet more baneful deſtructive tendency than has the ſame kind of waggon, and ought to be ſought after and deſtroyed as a nuiſance, with the ſame eagerneſs and deteſtation with which we would purſue a venomous beaſt. I have often wiſhed that ſome perſon of ability, ſkilled

ber of advances to labour againſt. This explains why a narrow wheel in the courſe of a day's ſtage, makes many more revolutions than a broad of the ſame height or diameter, becauſe it paſſes along a more ſcolloped or indented ſurface, which indentures it is its natural tendency to encreaſe, riſing over every minute eminence with an elaborate deliberateneſs; but, on the contrary, ſinks with a precipitated impetus into each irriguous baſon or ſluice, which in wet ſeaſons chequers the way

in mechanics and the laws of motion, would beſtow the pains to follow and obſerve a waggon when in a rough road. Such remarks as the violence, tendency, degree, frequency, direction, velocity of each pulſe or movement of the load, &c. might perhaps be as amuſing to himſelf and more uſeful to his country, than unriddling a knotty problem in mathematics, or mounting into the third heaven, and calculating the eclipſes of the ſatellites. For however unnoticed this axiom is, yet it is nevertheleſs certain, that every jolt a waggon receives, in whatſoever direction, it requires an additional draught or power to bear it onward, equal to the force that is neceſſary to give ſuch ſtroke, which with a burden from forty hundred to four or five ton, cannot be judged inconſiderable. It is alſo equally true that the ſame waggon and load wears a good road leſs than it would do a bad one; and we may alſo add as ſubſequent thereto, that leſs expence is required to keep in repair a good, than to patch and keep tolerable one that is already indifferent.

with

with innumerable little pools that are long in drying, and contribute to ſoften the face of the road, ſo that the materials, (as in morter) eaſily ſlide from their ſituation, are either cruſhed and buried with mud, or at leaſt their diſpoſition, and the texture of the ſtrata, is diſturbed and broken; and thus, by an unobſerved, unattended to proceſs, the road ſoon becomes founderous and impaſſible; dirt, holes, and ſuch ſloughs are formed, which when they become quite intolerable, the country people repair, if it may be called repairs, by throwing in faggots.

It will be judged needleſs to mention any of the contrary effects of theſe very broad caſt ones; effects which have been already intimated more than once. All that poſſibly can be ſaid againſt them muſt only amount to a ſurmiſe that they will move heavy *, which experience alone, (not argument) muſt refute. That they will benefit the roads is undoubted, and conſequently themſelves aſſiſt to remove

* The firſt effort, and while other waggons are in uſe, will be the moſt difficult.

the objection, if ſuch ſhould be fancied againſt them. Might it not be worth the pains, were the commiſſioners of turnpikes, purpoſely to employ machines for the rolling, ſmoothing and compreſſing the roads, in the ſame manner we do our private walks? But will not this, by the uſe of theſe wheels, be ſuperſeded by every farmer and carrier's waggon; who while they are doing their own buſineſs to better purpoſe, and with more eaſe than any other means, are alſo ſerving the public; and will they not deſerve for the more horſes they uſe, and the heavier loads they draw, a premium, rather than to be reſtrained by a penalty? See how ſweetly that machine moves along! how goodly the horſes in couplets ſtep like ſoldiers on duty! with what a conſtant ſteady ſwimming pace, it rolls along the path! how fine, ſmooth, and even it hardens and planeſies the face thereof, and makes it almoſt impenetrable!

N. B.

N. B. An exact deſcription of the form and dimenſion of each reſpective part of a waggon would be highly uſeful, but this I will beg leave to poſtpone.

The END of the FIRST PART.

PART II.

A few Remarks upon the HIGHWAYS.

A DISSERTATION on road-mending may be thought almoſt needleſs, when there is already ſuch a ſpirit raiſed, that ſhews itſelf very apparent in many parts of the nation; and I acknowledge myſelf a little out of my province upon ſuch a ſubject, rather than when treating upon mechanics; but am prompted thereto by its coincidence with the deſign and tenor of this piece.

THE earth is given to the children of men, and the management of this donation to his artifice, to mould agreeable to choice; an eſſay is hereby made of his abilities; and that every ſocial faculty might be employed and improved, the accommodations of life are not equally interſperſed and diſtributed, but are of a peculiar growth, lodged in ſelect repoſitories, or entruſted

entruſted in particular hands, which open a reciprocal dependance and communication between nation and nation, city and city, one family and another.

ROADS are the channels of this communication, and are ſimilar in ſociety to veins and arteries in the human frame; they carry nutriment to, and enliven the whole maſs; and in proportion as theſe are clogged and impeded, or fair and open, and in a commercial ſtate; ſo traffic and mutual intercourſe are in the ſame meaſure clogged, and on the decline, or rendered alert, healthful and flouriſhing.

THE importance then of theſe public avenues, theſe channels of conveyance, eſpecially in a trading merchandizing country remains undoubted: Do we not lay out garden plots and make pleaſant and curious walks to regale a few private ſteps? And ſhall the public walks of the nation, the paſſages of all our wealth and induſtry, ſeen by every eye and trod by every foot, remain in a ſtate of anarchy and without cultivation?

And here with due reſpect to our antient law-makers, is it not matter of ſome amazement, that an affair of ſuch conſequence ſhould be left to pariſh-duty and the care of an annual choſen ſurveyor, without weight, influence, ſkill, or any deſign in view? who had neither time or ability to carry a regular ſcheme into execution, and only left at the concluſion of his office manifeſt marks of ignorance, irregularity, inability, and ſloth. With equal reaſon might we not here expect to have found our pariſh churches and public edifices, entruſted to be erected and compleated by ſuch chance-medley workmen? without inſtructor or governor, plan, beauty, or order. But we have now the greateſt reaſon to hope from the wiſdom and attention of our preſent legiſlature, that means will ſpeedily be taken, and are even now in the embryo, that will give univerſal pleaſure and ſatisfaction on this head.

Whether commiſſioners, as at preſent elected for the ſurvey and care of turnpike roads, are the moſt proper, I will

not take upon me to determine; but certainly it is of the utmoſt conſequence, that ſelfiſh views, private animoſity, or want of ability, ſhould not intercept or ſpoil the intended deſign.

RATHER might it not be wiſhed, that the ordering and controul of this great affair, ſhould be wholly inveſted in the hands of gentlemen of the greateſt weight and influence? whoſe aims are as diſtinguiſhed as their perſonages, deſigns as noble as their blood, and whoſe public ſpirit and abilities tally with and equal their fortunes. Theſe are they to appoint, to put the wheels in motion; it is for mechanics and artificers to fulfil and execute. We may with equal juſtice expect our battles to be fought without officers, as any conſiderable undertaking to be well executed without governors *, and thoſe too of importance and authority.

Now

* That a pariſh officer ſhould call together his neighbours (many perhaps his ſuperiors, and upon whom he may have a dependance) and exerciſe a kind of juriſdiction over them as his workmen, carries in the face of it ſomething unnatural. When they are thus convened,

Now inſtead of ſmall ſocieties of commiſſioners, whoſe authority extends only to a narrow circumference, may not with more propriety, will not there be a greater probability of a more correct adminiſtration, were each county as one body to take cognizance of their own roads, ſubject at the quarterly ſeſſions, or at certain appointed conventions, to the inſpection and governance of the juſtices and leading gentlemen, to order and put in motion the ſprings of the machinery? A proper perſon or perſons, may there be appointed, who as their clerk, agent, or repreſentative, in whom their ſentiments and authority ſhall center, may be impowered to farm gates—make contracts—receive and pay—keep accounts—aſſiſt to form deſigns—bring to juſtice road offenders, and regulate the plan of operations.

vened, ſome motive muſt induce them to labour, and to do a proper day's work; either the eye of a ſuperior—an adequate reward—or a generous public ſpirit: the two firſt are wanting, and the laſt is ſcarce to be expected.

THE next gradation below the clerk of the county for the roads, will be the undertakers, for by this means undertakers of roads will be as familiar an appellation as undertakers of buildings; and theſe are the natural, the proper, the only effectual performers; men who make it their buſineſs, their trade, the employment of their lives: Men inured to, and experienced in the work, who may be called to an account, made to refund, or at leaſt aſhamed, if not performed in a workmanlike manner: Men whoſe bread depends upon their character, and who doubtleſs will take pains to ſupport it.

A SPIRIT of emulation, and the expectation of being ſcrutinized, are powerful incentives to action and induſtry; two or more of theſe clerks or ſuperintendents, may be appointed to look after each his diviſion of the county. Theſe are at leaſt annually to deliver in draughts or plans of the roads: point out where—when—how and at what expence repaired—their former and preſent ſtate—and what further improvements

improvements may poſſibly be made.—Duplicates of theſe, the one may be depoſited in the archives of the county, the other preſented for the inſpection and approbation of the national aſſembly.

THE putting of roads in a good and reſpectable condition is far from a light and trivial affair; or to be left to the option and appointment of any but approved and long experienced practitioners. There muſt be an unity or regularity in the deſign, which muſt be purſued to the completion of the ſcheme. — A plan of operations is to be laid down and obſerved, and a calculation of the expence that will attend the execution.—The importance of each road be conſidered, and an adequate improvement and pains beſtowed upon it.——The brow of that hill is to be chipped off and lowered, and the foot bedded up to make the aſcent eaſier.—Thoſe narrows, between my lord's grounds widened, and that tree and hedge the property of the parſon felled. —There is a cottage on the waſte in the way, remove it gratis to a more commodious ſituation. —— Here muſt be an arch

erected

erected over this current, and that part of the road drained and raiſed above the flood.—Let this ſtream be turned to one ſide, and not ſuffered any longer to remain a nuiſance.——That hollow way, with yonder crook or elbow in the road, rejected, and a ſtraight path carried through his worſhip's field.—This rock of ſtone, and that bed of gravel will yield ample proviſion for finiſhing the performance.

THESE are ſome of the neceſſary preparative ſteps towards a road, the infant traces of its future growth. Now the riches, generoſity and ſpirit, the true genius, taſte and character of a people, are principally diſcovered and determined by the well or ill management of their public operations: amongſt the chief of which we ſhall here rank the care and improvement of our highways; the worth and excellence of which, like that of foſſils, lie buried, trod upon, and in oblivion, through inattention and ſupineneſs, 'till raiſed, like gold, out of this obſcure occult ſtate, to uſefulneſs and brilliancy, by the vigorous exertion of labour and ingenuity. May

thoſe

thoſe then to whom this great work is committed, whoſe province it is to put in force and ſee the execution of the laws hereto relating, diſplay their zealous endeavours to put them upon ſuch a reputable footing, that will at once aid and quicken the negotiation of buſineſs—give an air of pleaſantry to our habitations—redound honour to the country we inhabit—teſtify the cordial, diſcreet, active ardour we breathe, to promote and bring to maturity ſo deſirable an acquiſition and common good: That as roads may be ſaid to wear the national livery, they may appear in a garb not unſuitable to the eminence of a Britiſh name and character. And while our merchants and fleets are engaged in extending our foreign commerce, we may be tracing out every ſtep, and taking the apteſt meaſures to aſſiſt, complete, and make permanent that at home.

To this end is there any thing we can turn our attention to, that has equally this direct and immediate tendency, or upon which our opulence and induſtry can be more worthily employed, and that will

anſwer even profuſeneſs ſo well as the ſubject will on which we are now treating? And if theſe (roads) are the places for ſervice and profit to the country, and will repay with ſuch high intereſt whatever is laid out upon them? They are not leſs ſo for beauty and ornament. For what a gladdening aſpect *; what an enlivening, cheering Paradiſaic countenance does a country aſſume from theſe when completely fine! Grant therefore we were diſpoſed to make even a magnificent appearance of our wealth, can we apply it better in character where it will be more expoſed to obſervation than in the very highways? And were we to exhibit a ſpecimen of neatneſs, ſymmetry, and elegance, is it not natural to do this where there is the greateſt concourſe, and where it will be ſure to meet with

* To behold the buſy tribes of men in their varied connections and intercourſes, (not to mention ſea ports and ſhipping) coaches ſpringing along with a light facile flight; the waggon rolling with a grave ſolemn majeſtickneſs; horſe and foot paſſengers in their alternate migrations; cities, villages, edifices, farms, cattle, fowls, inſects, mountains, woods, plains, rivulets, with all the infinite productions of nature, muſt fill the attentive imagination with the moſt delightful amuſement.

and

and raiſe the pleaſing paſſions of delight and admiration, in ſuch numbers of both native and foreign ſpectators. Were we therefore in purſuance of this, to root up every tree, hedge, and ſpray that grow on the border, and fence the road, and which by their vegetating alteration ſoon become obnoxious, and place in the room thereof poſts and rails, decently covered with a coat of oil colours, and at convenient diſtances alcoves for the repoſe of the wearied; or were we to proceed yet farther, to erect obeliſks and monumental ſtructures, enriched with trophies in relievo? Though theſe might juſtly be deemed exceſſes, yet would even ſuch extravagancies as theſe, be a thouſand times more commendable than the other extreme of negligently ſuffering them to go to rack; retarding and blocking up that commerce ſo neceſſary to the well-being, credit, and happineſs of a people. If we only confine ourſelves to that neatneſs which is conſiſtent with uſefulneſs, it will afford work enough for a continual watch and employ. Not that highways, if once

moulded firſt with a ſtrong plough, and afterwards with the ſpade (for the materials till this is done are of little uſe) out of their ancient barbarous crudeneſs, and digeſted into a graceful road-like form, will require any extraordinary continued expence to preſerve them ſo; not more, I ſhould think, than what is enjoined by pariſh-duty, were it properly executed. There is however very little danger of doing too much, the roads make ample return for whatever is laid out upon them; this no ſenſible perſon will deny, although it were ten times more than what is now done. There is no proportion between the expence that attends, and the advantage ariſing from beautiful paths. And carriages being the principal deſtroyers, it is but right they were obliged to pay even more toward their repair; the expence of gate-keepers will be the ſame, every addition therefore is neat advantage. And ſure I am that thoſe very teamholders would find their account in it; nor could they do an act of greater generoſity to themſelves than voluntarily make ſuch

offer:

offer: Caſh laid out this way, (though often it muſt be allowed with too little diſcretion) yet repays cent. per cent. I wonder commiſſioners do not fall more into the method I have already hinted, of farming roads to undertakers by the great; as every one that has been uſed to ſervants muſt know how profitable and ſatisfactory it is to each contracting party.

But to be more particular:

Turnpikes ſeem the moſt eaſy and natural method of raiſing collections for the ſervice of the ways; their great utility conſiſt in that they oblige each to depoſite in an exact proportion to his uſage of the road; and at the inſtant, and in the place where they are reaping the fruit of ſuch expence, when they ought to be beſt diſpoſed to do it willingly. This ratio could not well take place, (nor could many, eſpecially ſtrangers, be made to pay at all) by any other means. How far gates, were their number increaſed and pay augmented, might render

any further contributions or duties unneceſſary, is hard to conjecture. That they have been of ſingular ſervice hitherto admits of no doubt.

DIRECTORS, the trouble of erecting theſe is ſo trivial and uſe viſible, that the many deficiencies in this article, betokens at what a low ebb, how little regard is paid to the public utility, when ſet in competition with that of perſonal. But what ſhall we ſay when we come into the lonely, mountainous parts of the creation; where for many miles we behold not an human form, where many a dangerous, wandering ſtep might have been eſcaped by an extended finger? May he who here would not drop a penny towards ſetting up a poſt, wander on till the dawn of the next morn.

MILE-STONES are an entertaining piece of garniſh and road furniture, that by meaſuring the way make the hours paſs with pleaſure, and thereby much alleviate the tedious irkſomeneſs of a long ſtage.

HEDGES require a particular, extraordinary care, and without much pains make a very obnoxious fence to a road: they intercept the ſalutary virtue of the ſun and air, that contribute ſo very largely to keep it dry and in good condition. Their returning luxuriance mocks the labour of the workman; nor have all our laws hitherto made upon this article had their deſired effect; and if they have not, we may ſafely aver they never will: A law not duly enforced is tantamount to none at all, or is a dead letter. May not hedges be ſo far deemed to belong to the road, as (at leaſt on the ſide next thereto at the public expence, and by the direction of the agent) to be trimmed, and the ditch ſcoured every year? And its growing height reduced within due bounds by the landholders being obliged, by an unerring conſtancy, and penal ſanction, to plaſh* it every fourth? May

* If this operation was ordered to be univerſally performed at the ſame time (between Chriſtmas and Lady-day) of the ſame year: He who neglected to obey the injunction, would be ſo conſpicuous to every obſerver, that either the fear of incurring the penalty, or the odium

May not trees within ſuch a diſtance, be a forfeiture to the hand that will fell and take them away?

FOOT-WALKS are made with very little trouble or expence; why may not four foot on one, or rather each ſide next to the fence, be appropriated to ſo uſeful a purpoſe. Any materials are ſufficient thrown up high, and with a ſlight cover of gravel, and will when once done want ever after little or no repair: yielding moreover an ornamental, uniform, and agreeable verge, or border on either hand; and is certainly quite in character with the definition of a road, which ought to comprehend all the different modes of travelling. Next to theſe let two

dium of his ſingularity would, one ſhould think, enforce compliance. Or, perhaps were the law ſilent, with reſpect to the occupier, and the agent alone was commiſſioned not only to ſee the ditch ſcoured, and the ſide of the hedge trimmed next to the road; but alſo its height every autumn (all the growth of the preceding ſummer) cut or ſtruck off with a hook: Would not this operation make the fence grow thick and beautiful like a verdurous wall—allow the air to circulate upon the road, and open the country to the view of the traveller?

CHANNELS be ſunk, ſix feet wide, and not leſs than two feet below the crown of the foot and carriage-way, which may be raiſed by what is dug out of theſe ſluices. Theſe receptacles will keep at a due diſtance the foot-walks, and help to preſerve the road dry, by taking off its excrementitious waſhings; adding variety, beauty, and uſe to the whole. Let the

CARRIAGE TRACT be the ſegment of a circle whoſe diameter is ſixty-ſeven feet; the chord of the ſegment thirty-two feet. Allowance of more compaſs may be made when near to populous places. The crown of the arch will riſe above the ſubtenſe two feet, which will be ſufficiently circular to anſwer every purpoſe and to caſt off that moiſture, which together with narrow wheels are the two main enemies that wage war againſt and deſtroy all our roads.

When the maſter of the work is about to lay out his ſubſequent road, let him well ſurvey and conſider its preſent form and conſtruction; let all hillocks and redundancies be took away to make good, or bed up the deficiencies of lower places, remembring that its future, laſting, ſettled ſtate, depends upon this firſt operation. Let all aſcents and deſcents, be made as eaſy as the nature of the caſe or the courſe of the country will admit. All croſs currents, though very ſmall, and iſſuing only from a ſpring, or occaſioned by a ſudden ſhower, ſhould be thrown under an arch. Let the foot (if allowed) and middle or main way, be made ſo near an height, that an horizontal line ſtretched acroſs may touch the crown of each. The ſtrong plough is an uſeful inſtrument to mould the firſt ſketch and rough draught of the deſign. The ſpade now takes place, and gives the laſt ſtroke, the finiſhing intention, to its bare uncovered form; and now if it were rolled (with ſomething like ſuch rollers, only heavier, that are uſed on bowling-greens) would give it a com-

pact

pact firmneſs, preparatory to laying thereon and enrobing it with its ultimate attire. It need not be urged that ſtone broke very fine and then gravel, are the articles for this purpoſe. Theſe, if not near, will (eſpecially the latter) well anſwer the expence of carriage, though ten or fifteen miles diſtance, which may be brought in large quantities by the new conſtructed carriage, I will not ſay a barge-load at a time.

THE work being finiſhed and put into this excellent form and attire, by much ſkill, labour, and expence, and covered with a good coat of gravel, or ſuch hard materials as the country affords, laid with a true, fine, graceful face, and kept in a neat, clean, goodly condition, by perſons appointed to ſuch truſt: I ſay when it is brought to this perfection, aſſiſting intercourſe—yielding facility to the motion of carriages—inviting the company of, and giving univerſal ſatisfaction, pleaſure, ſafety, ſpeed to every kind of traveller—and as it were diminiſhing diſtances, by adding eaſe and celerity to his ſteps—making even the

whole landſkip ſmile upon him with a redoubled luſtre: Would it not grieve and inſpire with indignation any conſiderate, ſenſible mind, who has the leaſt ſpark of benignity to his native country, to ſee it all fruſtrated and deſtroyed by the ſufferance of ſuch noxious vehicles, that break the face—let in wet—generate dirt—and ſo deſtroy and efface the beauty of its form, as would ſoon reduce it to the moſt diſagreeable, uncouth, founderous ſcene of diſorder, not leaving the leaſt trace of its former elegance and completeneſs.

In order to preſerve a road in the beauty we have been recommending, not a grain ſhould be fretted, diſturbed or miſplaced; neither a narrow nor a rough edged wheel can quadrate with the intention, no more than variegated ſeals can enſtamp the ſame figure. The wheel muſt meet, lie upon, and occupy the road its whole breadth, and by application, without the leaſt degree of friction. To this end the face of the periphery muſt be true, ſmooth, and cylindric, and of a conſiderable breadth or width. But the periphery of a nine inch

inch wheel being uneven and varied, does, when in contact with the ground, preſs on only part of its breadth, and the next wheel that paſſes makes a quite different impreſſion; conſequently every wheel of this ſort a new and partial print. Thus this weighty orb is tugged along to anſwer but half its purpoſe; the main intended benefit is much leſſened, and the face of the road ſomewhat torn, confounded, and mangled, rather than rolled and made even: but caſt-wheels will exactly match each other, make, whether high or low, the very ſame impreſſion, and run parallel to, and intimately embrace the face of a true plane. Theſe then when in action with heavy loads, will ſo effectually planiſh, denſify, and cloſe up the earth's pores as not eaſily to admit of wet, at leaſt not ſo as to diſunite its texture, but will remain firm under long continued ſhowers, which will fall quick off, and the remaining ſuperficial moiſture (like that upon a plane ſtone) will ſoon be exhaled, and the ground recover its ſiccity.

LET us haſten then to make uſe of this catholicon for roads here recommended, *(to wit)* "Caſt-metal wheels," behold them rolling along under the oppreſſive weight of tons, giving a firmneſs to the terras they move on, little inferior to the metal with which they are environed. The more theſe are burdened the more beneficial and happy will be the effect.

THE great increaſe in the number of carriages, of all ſorts of late years, as it points out the growing ſtate of our commerce, is a reaſon why the roads require an additional care and expence. Alſo the growing numbers of thoſe for pleaſure, and the great improvements made in them much beyond other countries, reflects honour to this nation, and inſtead of being an argument of our pride and luxury, rather ſprings from opulence obtained by induſtry, and expended with judgment and true taſte: for perhaps our moſt innocent as well as pleaſanteſt hours are thoſe employed in travelling, and which is always allowed to be productive of

health; why ſhould not theſe then be made as agreeable and delectable as poſſible? Moreover

OUR ſituation as an iſland, and proximity to the northern regions, the one inclining to wet, the other cold, make alſo the care of our roads more peculiarly neceſſary than in thoſe climates where the heat of the ſun is more intenſe. Were it not ſo, is it our choice to be the laſt to reform? Let us therefore ſuccour every expedient, that promotes their amendment; and together with regulating our caravans or road-way machines, another important (I ſhould ſay firſt and leading) ſtep, is to eſtabliſh a well planned government or political diſcipline, which muſt neceſſarily conſiſt of degrees, *(to wit)* the prime controul, or firſt moving principle, lodged in the hands of gentlemen; ſecondarily the agents, who are each to have his allotment of roads to manage, without interfering with one another; but this, with all due deference to the ſettled diſpoſal of things, is referred to ſuperior judgments.

HAD

HAD a Boyle or a Newton, with their abilities been doomed to follow a waggon for ſeven years, what lights would they have thrown upon the ſubject? the whole energy of Euclid had been poured upon every ſtep: the effects of the waggon upon the road, and the road upon the waggon, would have been aſcertained and exemplified by mathematical demonſtration. A calculation of the value of carriage through the nation, might perhaps have employed their genius; and may-be in the counter-ſcale that of the ſea in contraſt. Fewel for our fires, manure for our lands, gravel, ſtone, timber, lime, together with all the various tribes of manufactures would have been minutely and reſpectively conſidered, nor would they have paſſed by the advantage of expediting of troops for the defence of this our iſland. What important effects ſpring from Good Roads!

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LET us then lay ourſelves out to attain this happy iſſue, and make every highway ſupply the place of a navigable ſtream.

FINIS.